WHAT IS CLAIMED IS:

1. An automatic transfer switch for alternately connecting a load to a first power source or a second power source, the transfer switch comprising:

a main switch having two input terminals and an output terminal, the output terminal connected to the load;

a first switch interposed between a first input terminal of the main switch and the first power source;

a second switch interposed between a second input terminal of the main switch and the second power source; and

a controller adapted to simultaneously open the first switch and switch the main switch from the first input terminal to the second input terminal and, upon expiration of a delay time, to close the second switch.

2. The transfer switch of claim 1 wherein the delay time is equal to ½ cycle of an AC voltage supplied by the first power source.

3. The transfer switch of claim 1 wherein the delay time is an interval required for arcing across the first switch to stop.

4. The transfer switch of claim 3 wherein the interval is determined by detecting a zero voltage across the first switch.

5. The transfer switch of claim 3 wherein the interval is determined by detecting a high voltage across the first switch.

6. The transfer switch of claim 3 wherein the interval is determined by detecting a zero current through the first switch.

7. The transfer switch of claim 1 wherein the delay time is the shorter of ½ cycle of an AC voltage supplied by the first power source or an interval required for arcing across the first switch to stop.

8. The transfer switch of claim 7 wherein the interval is determined by detecting a zero voltage across the first switch.

9. The transfer switch of claim 7 wherein the interval is determined by detecting a high voltage across the first switch.

10. The transfer switch of claim 7 wherein the interval is determined by detecting a zero current through the first switch.

11. A method for detecting failure of an AC signal source comprising:
rectifying the AC signal;
rectifying a quadrature signal of the AC signal;
adding the rectified signal and the rectified quadrature signal;
comparing the sum of the rectified signal and the rectified quadrature signal to a predetermined threshold voltage.

12. The method of claim 11, wherein the quadrature signal is obtained by differentiating the AC signal.

13. The method of claim 11 wherein the quadrature signal is obtained by passing the AC signal through an all-pass filter.

14. The method of claim 11 wherein the step of rectifying the AC signal is performed by squaring the AC signal, and the step of rectifying the quadrature signal is performed by squaring the quadrature signal.

15. A method of operating an automatic transfer switch having a main switch with an output terminal coupled to a load and two input terminals coupled via first and second cross-conduction prevention switches to first and second AC power sources, the method comprising:

detecting failure of the first AC power source by:

rectifying an AC signal generated by the first AC power source;

rectifying a quadrature signal of the AC signal;

adding the rectified signal and the rectified quadrature signal; and

comparing the sum of the rectified signal and the rectified quadrature signal to a predetermined threshold voltage, whereby a failure is detected when the sum is less than the predetermined threshold voltage.

upon detecting a failure of the first source, simultaneously switching the main switch from the first power source to the second power source while opening the first cross-conduction prevention switch; and

upon expiration of a delay time, closing the second cross-conduction prevention switch.

16. The method of claim 15 wherein the delay time is equal to ½ cycle of an AC voltage supplied by the first power source.

17. The method of claim 15 wherein the delay time is an interval required for arcing across the first switch to stop.

18. The method of claim 15, wherein the quadrature signal is obtained by differentiating the AC signal.

19. The method of claim 15 wherein said quadrature signal is obtained by passing the AC signal through an all-pass filter.

20. The method of claim 15 wherein the step of rectifying the AC signal is performed by squaring the AC signal, and the step of rectifying the quadrature signal is performed by squaring the quadrature signal.